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2,855,880

SEWING NEEDLE CLAMPS

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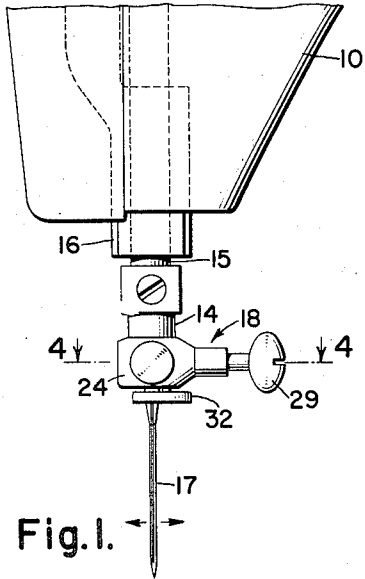


Fig. 1.

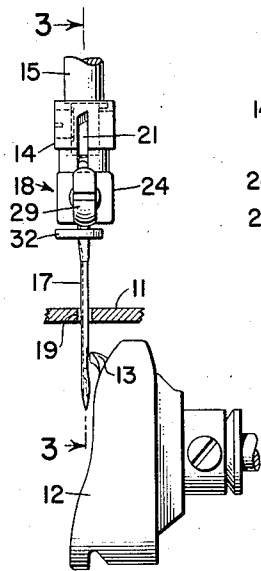


Fig. 2.

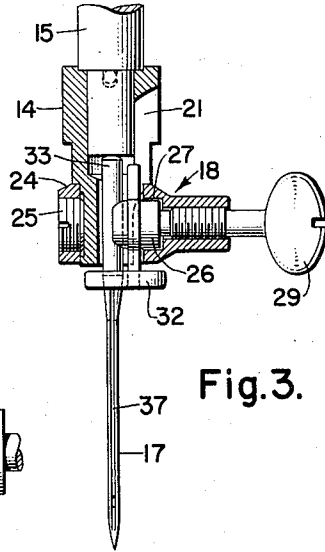


Fig. 3.

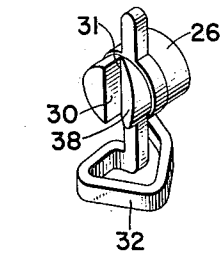
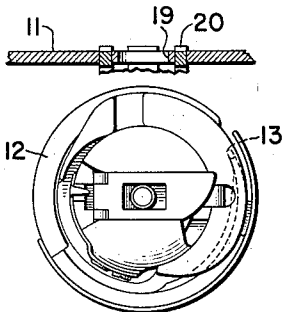


Fig. 5.

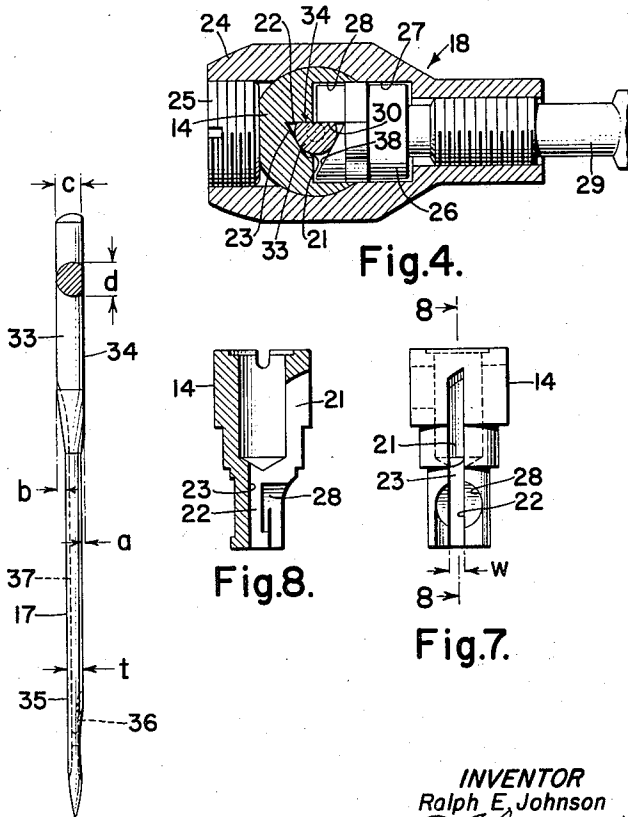


Fig. 6.

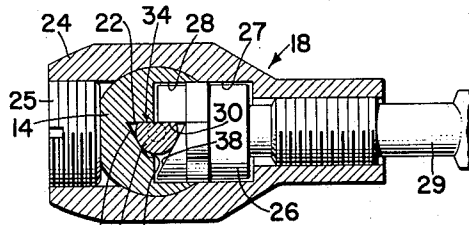


Fig. 7.

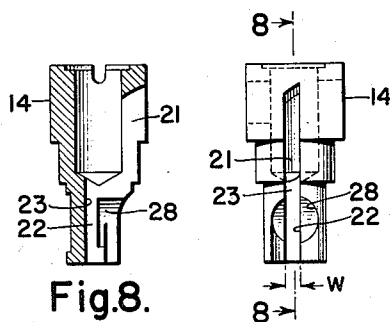


Fig. 8.

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## SEWING NEEDLE CLAMPS

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Application October 5, 1954, Serial No. 460,458

4 Claims. (Cl. 112—226)

This invention relates to sewing machines. More particularly, the invention relates to a clamping device for fastening a sewing needle to the needle-bar of a sewing machine in proper relation to the sewing machine loop-taker and is an improvement on the device shown in my copending application Serial No. 238,425, filed July 25, 1951, now Patent No. 2,698,589, dated January 4, 1955.

An object of the invention is to provide a sewing needle clamp for a sewing machine which will accept a sewing needle in one position only.

Another object of the invention is to provide a sewing needle clamp for a sewing machine which assures passage of the sewing needle in correct relation to the loop-taker.

A further object of the invention is to provide a needle clamp for a sewing machine which firmly supports the sewing needle.

In the drawings, Fig. 1 is a front view, partly in section, of a sewing machine loop-taker and a needle-carrier embodying the needle-clamp structure of the present invention.

Fig. 2 is a side view of the needle-carrier and loop-taker at approximately the time of maximum needle penetration.

Fig. 3 is an enlarged sectional view of the needle-clamp taken substantially on line 3—3 of Fig. 2.

Fig. 4 is an enlarged sectional view taken substantially on line 4—4 of Fig. 1.

Fig. 5 is a perspective view of the needle-clamping gib.

Fig. 6 is an enlarged side view in elevation of a conventional sewing needle.

Fig. 7 is a side view of the needle-carrier.

Fig. 8 is a sectional view of the needle-carrier taken on line 8—8 of Fig. 7.

Referring more particularly to the drawings, portions of a sewing machine head 10 and a work-support 11 are shown in Fig. 1 which forms parts of a conventional zigzag type of sewing machine, such as the machine shown in U. S. Patent No. 2,005,673 of G. M. Eames. A conventional circularly movable loop-taker 12 is shown located beneath the work-support 11 and is provided with a thread-loop-seizing beak 13. The head 10 carries a reciprocable needle-carrier 14 supported by a bar 15 which is mounted in a laterally vibratable frame 16. The frame 16, needle-carrier 14 and loop-taker 12 are actuated in synchronism by the usual zigzag sewing machine mechanism similar to that shown in the above mentioned U. S. Patent No. 2,005,673. A sewing needle 17 is fastened to the lower end of the needle-carrier by means of a clamp device 18 and passes through a hole 19 in the work-support 11 to cooperate with the loop-taker in forming stitches. The usual feed-dog 20 advances work material over the work-support 11.

The needle-carrier 14 is provided with a slot 21 having a flat side wall 22 and a bottom surface 23. The angle included between the side wall 22 and the bottom surface

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23 is less than 75° and in the embodiment shown the angle is approximately 60°. A clamping band 24 encircles the needle-carrier 14 and is fastened thereto by a set screw 25. A clamping gib 26 is fitted in a counterbore 27 in the clamping band 24 and a complementary recess 28 in the needle-carrier 14. Movement of the clamping gib 26 transversely of the needle-carrier 14 is effected by a thumb-screw 29 threaded into the clamping band 24. The end of the clamping gib 26 disposed in the needle-carrier 14 is grooved. One wall 30 of the groove is flat and lies in the same plane as the flat side wall 22 of the slot 21. The other wall 31 of the groove 31 is inclined to the wall 30. The included angle between the two walls of the groove 31 is less than 75° and, as shown in the drawings, is approximately 60°. A thread-guide 32 is carried by the gib 26 and lies in the slot 21, functioning to prevent the gib from turning. The needle 17 is a conventional needle of the type used in family sewing machines which is provided with a slab-sided cylindrical shank 33 and a blade 35 shown in Fig. 6. The flat 34 of the shank 33 is positioned against the flat walls 22 and 30 of the slot 21 and groove 31, respectively. In zigzag sewing machines it is essential that the sewing needle and loop-taker cooperate in a prescribed manner at all times. In any sewing machine, it is necessary for the blade 35 of the sewing needle 17 to pass within a fixed distance of the loop-taker beak 13 in order for the beak 13 to seize the needle-thread (not shown). It is also essential that the side of the needle-blade 35 having the short groove 36 must be adjacent to the beak 13 in order for a stitch to be formed. Practically all family type sewing machines use needles of the type shown in Fig. 6, which are provided with a slab-sided cylindrical shank 33 and a blade 35. The side of the blade 35 adjacent to the plane of the flat 34 on the shank 33 is provided with a short slot 36 while the opposite side of the blade 35 is provided with a long slot 37. Most needles of this type regardless of their size designation are manufactured from wire of a fixed cross-sectional diameter "d" which forms the shank 33 of the needle. The central axis of the shank before the flat 34 is formed is coaxial with the central axis of the blade 35. The flat 34 on the shank 33 is formed so that the plane of the flat 34 passes a fixed distance "a" from the surface of the blade 35. The thickness "t" of the blade 35 varies according to the size of the needle but the distance from the plane of the flat 34 on the shank 33 to the surface of the blade 35 remains the same regardless of the size of the needle. It is believed to be apparent from the above description that for various sizes of needles, the dimensions "b," "c" and "r" vary considerably but the dimensions "a" and "d" remain constant. When the various parts of the sewing machine are assembled, great care is taken to adjust the position of the loop-taker so that at the moment when the beak 13 seizes the needle-thread (not shown), the beak passes a prescribed distance from a plane including the flat wall 22 of the slot 21 and the flat wall 30 of the groove 31. Since the dimension "d" of the needle remains constant regardless of needle size, it is only necessary to insert the needle in the needle-carrier 14 with the flat 34 against the flat walls 22 and 31 in order to be assured that the loop-taker beak 13 will always pass the needle-blade 35 at the proper distance regardless of the needle size.

In view of the fact that the needle-clamp thumb-screw 29 is used to drive many sewing machine attachments, it is essential that its conventional position at the right of the needle-carrier 14 be preserved, as shown in Fig. 1. Thus, in a zigzag type of sewing machine the needle 17 must be clamped from the side in order to maintain the correct angular position of the needle relative to the

loop-taker beak 13. The slot 22 in the needle-carrier 14 and the groove 31 in the clamping gib 26 accomplish this purpose when the movement of the clamping gib 26 laterally of the needle-carrier 14 is limited in the manner to be described.

The width "w" of the slot 21 in the needle-carrier is limited to a dimension which is larger than the minor shank cross-sectional dimension "c" for the largest size of needle and smaller than the fixed major shank cross-sectional dimension "d." This limitation prevents the needle 17 from being inserted sideways but does not prevent it from being inserted 180° out of correct position. The angled walls of the slot 21 and groove 31 and the limited movement of the clamping gib 26 prevent insertion of the needle backwards.

It will be seen from the sectional view in Fig. 4 that the cross-section of needle-shank 33 is a portion of a circle greater than a semi-circle and that the walls 22 and 23 of the slot 21 and walls 30 and 38 of the gib groove 31 form a geometric figure, which in the embodiment shown is substantially a trapezoid circumscribing the needle-shank cross-section. Since the gib 26 is movable to permit removal of the needle 17, the cross-section trapezoid is expandable but it is obvious that in order to insert the needle 17 in a position rotated 180° from the correct position shown in Fig. 4, that the triangle must be expanded considerably in order for the shank to be admitted. In the construction according to my invention, the outward movement of the gib is limited by the clamping band 24 so that it cannot move far enough to admit the needle backwards.

From the foregoing description, it is believed to be apparent that I have provided a novel needle-clamp for a sewing machine which assures the correct positioning of the sewing needle relative to the sewing machine loop-taker and which is simple in construction and inexpensive to manufacture. Further, it is believed to be apparent that the invention is not limited to machines provided with loop-takers having a horizontal axis but may be used with machines having other forms of loop-taker arrangements.

Having thus set forth the nature of the invention, what I claim herein is:

1. A sewing machine having a head portion and a work-support, a reciprocating needle-carrier supported by said head portion, a needle-clamp adapted to hold needles of different sizes and including said needle-carrier, said carrier having a needle receiving slot formed therein provided with a flat side and a flat bottom surface, the angle included between said side and said bottom surface being less than 75°, a movable needle-clamping gib cooperating with said slot and provided with a groove, said groove having a flat side lying in substantially the same plane as the flat side of said slot, and a side inclined to said flat side, the included angle between said flat side and said inclined side of said groove being less than 75°, a sewing needle positioned in said slot and having a shank formed as a slab-sided right circular cylinder, said shank having a major and a minor cross-sectional dimension, and means limiting movement of said gib crosswise of said needle-carrier.

2. A sewing needle clamp adapted to carry needles of different sizes comprising a needle-carrier provided with a needle-receiving slot formed at one end, said slot

having a flat side wall and a bottom wall disposed at an acute angle relative to said side wall, said slot being adapted to receive a slab-sided cylindrical needle shank having a flat side for engagement with said flat side wall of the slot, and means for clamping a needle in the slot comprising a clamping band encircling said needle-carrier, a clamping gib carried by said clamping band and intercepting said slot, said clamping gib having a clamping face opposed to said bottom wall of said slot and disposed at an acute angle to said flat side wall, a thumb screw carried by said clamping band and engageable with said clamping gib, said thumb screw having an axis of rotation parallel to the plane of said side wall.

3. In a sewing machine having a frame including a head, a loop taker mounted in said frame below said head and having a circularly-moving loop-seizing beak, a needle-carrying member mounted in said head for reciprocation in a plane parallel to the plane of motion of said loop-seizing beak, said needle-carrying member having a needle-receiving slot formed therein and having a flat wall parallel to and a fixed distance from the plane of motion of said loop-seizing beak, said slot being adapted to receive a slab-sided cylindrical needle shank having a flat side for engagement with said flat wall of the slot, and means for clamping a needle in the slot comprising a clamping band encircling said needle-carrying member adjacent to said slot, a clamping gib disposed between said clamping band and said slot for movement in a direction parallel to said flat wall, and means engageable with said gib for moving said gib in a direction parallel to said slot.

4. In a sewing machine having a frame including a head, a loop-taker mounted in said frame below said head and having a circularly moving loop-seizing beak, a needle-carrying member mounted in said head for reciprocation and for lateral vibration in a plane parallel to the plane of motion of said loop-seizing beak, said needle-carrying member having a needle-receiving slot formed therein and having a flat wall parallel to and a fixed distance from the plane of motion of said loop-seizing beak, said slot being adapted to receive a slab-sided cylindrical needle shank having a flat side for engagement with said flat wall of the slot, and means for clamping a needle in the slot comprising a clamping band encircling said needle-carrying member adjacent to said slot, a clamping gib disposed between said clamping band and said slot for movement in a direction parallel to said flat wall, means on said clamping band for limiting the movement of said clamping gib in a direction away from said slot, and means engageable with said gib for moving said gib in a direction toward said slot.

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